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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,070	12/04/2003	John W. Ketchum	030018	9173

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QUALCOMM INCORPORATED
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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	03/06/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 03/06/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/729,070	KETCHUM ET AL.	
	Examiner	Art Unit	
	Emmanuel Bayard	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, 7-15 and 17-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Jalali et al U.S. Pub No 20060023666 A1.

As per claims 1 and 20, Jalali et al teaches In a wireless multiple-input multiple-output (MINO) communication system (see fig.1 and page 3 [0036]), a method of deriving a matched filter based on a steered reference, comprising: obtaining a plurality of sets of received symbols (see page 3 [0038]) for the steered reference received via a first link and generated based on a plurality of steering vectors (see page 7 [0073]) and deriving the matched filter based on the plurality of sets of received symbols, wherein the matched filter includes a plurality of eigenvectors corresponding to the plurality of steering vectors (see page 6, [0067] and page 7 [0070], [0073]).

As per claim 2, Jalali et al inherently teaches wherein each of the plurality of sets of received symbols is for a steered reference symbol generated based on one of the plurality of steering vectors (see page 7 [0073] and page 12 [0121-0124])) .

As per claim 3, 12 Jalali et al teaches wherein the plurality of eigenvectors of the matched filter are orthogonal to one another (see pages 9-10 [0100]).

As per claims 4, 13 Jalali et al inherently teaches, wherein the plurality of eigenvectors of the matched filter are orthogonalized using QR factorization (see page 7 [0070]).

As per claim 5, Jalali et al inherently teaches estimating gains associated with the plurality of steering vectors based on the plurality of sets of received symbols; and ordering the plurality of eigenvectors based on the estimated gains (see page 18 [0186])

As per claim 7, Jalali et al inherently teaches, wherein the plurality of eigenvectors of the matched filter are orthogonalized using polar decomposition (see page 6 [0066-0067]).

As per claim 8, Jalali et al inherently teaches wherein the steered reference is received over multiple frames (see page 1 [0006]).

As per claim 9, Jalali et al teaches performing matched filtering of a data transmission received via the first link using the matched filter (see page 7 [0070]).

As per claims 10, 21 and 27, Jalali et al teaches a wireless multiple-input multiple-output (MIMO) communication system, a method of deriving eigenvectors used for spatial processing, comprising: obtaining a plurality of sets of received symbols for a steered reference received via a first link and generated based on a plurality of steering vectors, wherein each of the plurality of sets of received symbols is for a steered reference symbol generated based on one of the plurality of steering vectors(see page 3 [0038] and page 7 [0073]); determining a plurality of scaled vectors based on the

plurality of sets of received symbols (see page 2 [0014, 0021], wherein each of the plurality of scaled vectors corresponds to a respective one of the plurality of steering vectors page 7 [0073]); and deriving a plurality of eigenvectors based on the plurality of scaled vectors, wherein the plurality of eigenvectors are used for matched filtering of data transmission received via the first link (see page 6, [0067] and page 7 [0070], [0073]).

As per claim 11, Jalali et al inherently teaches, wherein each of the plurality of scaled vectors is determined based on at least one set of received symbols for at least one steered reference symbol generated based on the corresponding steering vector.

As per claim 13, Jalali et al inherently teaches wherein the deriving includes performing QR factorization on the plurality of scaled vectors to obtain the plurality of eigenvectors.

As per claim 14, Jalali et al inherently teaches wherein the deriving includes performing polar decomposition on the plurality of scaled vectors to obtain the plurality of eigenvectors (see page 6 [0066-0067]).

As per claims 16 and 22, Jalali et al inherently teaches estimating singular values based on the plurality of scaled vectors (see [0124]); and deriving a matched filter for the first link based on the plurality of eigenvectors and the estimated singular values (see page 7 [0070]).

As per claims 17 and 25, Jalali et al inherently teaches wherein the plurality of eigenvectors are used for spatial processing for data transmission on a second link (see fig.1).

As per claim 18, Jalali et al inherently teaches wherein the first link is an uplink and the second link is a downlink in the MIMO communication system (see fig. 1 and page 3 [0036]).

As per claims 19 and 26, Jalali et al inherently teaches wherein the MIMO communication system utilizes orthogonal frequency division multiplexing (OFDM), and wherein the plurality of eigenvectors are derived for each of a plurality of subbands (see page [0015-0018]).

As per claim 23, Jalali et al wherein the plurality of eigenvectors are orthogonal to one another (see pages 9-10 [0100]).

As per claim 24, Jalali et al inherently teaches wherein the controller is operative to perform QR factorization, polar decomposition, or minimum square error computation on the plurality of scaled vectors to obtain the plurality of eigenvectors (see page 6 [0066-0067])..

As per claim 28, Jalali et al teaches means for performing matched filtering of a first data transmission received via the first link using the plurality of eigenvectors (see page 7 [0070]).

As per claim 29, Jalali et al inherently teaches means for performing spatial processing for a second data transmission on a second link using the plurality of eigenvectors (see fig.1).

As per claim 30, Jalali et al teaches wherein the plurality of eigenvectors are orthogonal to one another(see pages 9-10 [0100]).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jalali et al U.S. Pub No 20060023666 A1 in view of Krishman et al U.S. Patent No 7,039,001 B2.

As per claim 6, Jalali et al teaches all the features of the claimed invention except wherein the plurality of eigenvectors of the matched filter are orthogonalized using minimum square error computation.

Krishman et al teaches the plurality of eigenvectors is orthogonalized using minimum square error computation (see col.9, lines 50-67 and ccol.10, lines 1-25).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Krishman into Jalali as to obtain the quality of the enhanced channel frequency estimation of each vector as taught by Krishman (see col.9, lines 40-67).

As per claim 15, Jalali et al teaches all the features of the claimed invention except wherein the deriving includes performing minimum square error computation on the plurality of scaled vectors to obtain the plurality of eigenvectors.

Krishman et al teaches performing minimum square error computation on the plurality of scaled vectors to obtain the plurality of eigenvectors (see col.9, lines 50-67 and ccol.10, lines 1-25).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Krishman into Jalali as to obtain the quality of the enhanced channel frequency estimation of each vector as taught by Krishman (see col.9, lines 40-67).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272 3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571 272 2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Emmanuel Bayard
Primary Examiner
Art Unit 2611

2/27/07

EMMANUEL BAYARD
PRIMARY EXAMINER